



Unhealthy housing experiences of subdivided unit tenants in the world's most unaffordable city

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Abstract

The association between housing and health is widely concerning; however, few studies exist about the mechanisms linking housing and health to a global city with extremely high housing costs and tiny living areas. In Hong Kong, despite an increasing population living in subdivided units, the impact of tiny living areas on resident health has not been sufficiently researched. The purpose of this study is to further explore the experiences of residents living in subdivided units to understand how housing elements influence physical and mental health. Data were collected through semi-structured interviews with subdivided unit residents in Hong Kong. This study extends a theoretical framework of housing impact on health (based on the Four Cs) to the Five Cs: (1) *cost*, (2) *condition*, (3) *consistency*, (4) *context*, (5) *constitution*. The results indicated that high rent prices, small living areas, poor environments, and precarious situations severely impacted the physical and mental health of residents.

Keywords Housing · Health · Subdivided units · Public housing · Hong Kong

1 Introduction

Recent housing and policy studies report growing concerns regarding the relationship between housing and health (Bever et al., 2021; Davison, Ferris, Pearson, & Shach, 2019; Garnham et al., 2022; You, Guo, Wu, & Wu, 2021). This study focuses on the impact of different housing elements on the health situations of subdivided unit residents. The relationship between housing, physical health, and mental health is reviewed first, followed by a description of the special housing context in Hong Kong. After a review of related research about Hong Kong, research gaps and a conceptual framework of this study are provided. Next, research methodology, data collection procedures, and ethical concerns are

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introduced. The results are presented under Swope and Hernández's (2019) Four Cs framework, with an additional C for this study, followed by a discussion about the significance of housing perspectives on the study of health.

1.1 Housing, physical health, and mental health

The impact of housing on physical health is a long-standing concern (Howden-Chapman et al., 2012), especially for low-income families. Poor housing situations are normally negatively associated with health status (Shaw, 2004). Research has shown that housing is one of the major environmental factors affecting the health of individuals (Braubach, 2011). To study the impact of housing on health status, certain housing factors have been frequently highlighted in research, such as housing cost (Pollack et al., 2010), housing tenure (Morris, 2018), housing security (Marquez et al., 2019), housing environment (Howden-Chapman et al., 2012), and living density (Lawrence, 2012b). For example, recent research determined that a number of housing characteristics, including housing costs, housing tenure, and desire to stay, were associated with a biomarker linked to infection and stress (Clair & Hughes, 2019). The influence of housing was not static but rather dynamic and long-term (Marsh et al., 2000). Research also supports that the negative effects of poor housing situations are cumulative throughout life (Howden-Chapman et al., 2012). The impact of housing has been suggested to be studied in a pathway (Piat et al., 2015) and life-course approach (Izuhara, 2015). Housing factors are usually linked together: for example, housing affordability is usually directly associated with housing quality, tenure, and security, and these factors further influence the household income and individual health (Baker et al., 2014).

On the other hand, numerous studies support the assertion that poor housing situations negatively associate with the mental health status of residents (Evans et al., 2003; Singh, Daniel, Baker, & Bentley, 2019). Several housing factors have frequently shown significant negative impact on mental health situations, including housing stability and precarity (Bentley et al., 2019; Durbin et al., 2019), housing affordability (Baker et al., 2014), living environment (Rautio et al., 2018). For example, research shows that poor mental health is associated with high housing costs in industrialized countries, and financial constraints have a negative effect on the mental health of residents (Tam et al., 2010). Although the association between housing and mental health has been supported by numerous studies, scholars suggest that the mechanism that correlates housing dimensions to poor mental wellbeing is still unclear and worth further research (Singh et al., 2019).

Despite numerous studies about the relationship between housing, physical health, and mental health, the interaction between these factors varied for different locations and time, with no clear conclusion about the mechanisms and pathways of influence. Many studies have focused on studying isolated variables at certain points in time, while overlooking interaction among various dimensions of housing and health over a long period. The mechanism that links housing and health has been understudied (Lawrence, 2012a). Moreover, people with different demographic backgrounds may react differently to similar housing situations. For example, very young and very old individuals generally suffer more from poor living environments (Howden-Chapman et al., 2012). Further research is needed to explore the impact of housing on health for individuals and families from different backgrounds as well as the impact of housing interventions on health status to promote better policy decisions (Lawrence, 2012a).

1.2 The context of Hong Kong

1.2.1 A global city with high housing costs and tiny flats

Hong Kong is one of the most densely populated cities in the world (Chan, 1999; Chan et al., 2020; Hui & Yu, 2013), and it is a typical example of a global city, based on rising house and rent prices, deteriorating housing conditions, and financialisation of housing (Fernandez & Aalbers, 2016). Hong Kong also has the least affordable housing among 293 metropolitan housing markets in the world, according to a survey conducted by Dermographia (2017). Although Hong Kong government highly concern the housing issues, housing problems still have not been solved (Goodstadt, 2013). In Hong Kong, housing and rent prices have sharply increased in recent years. According to the rating and valuation department, the rent index of domestic private housing dropped from 134.5 at its previous peak in 1997 to 73.6 in 2003, kept rising to 194.4 in 2019, and made a slight downward adjustment from 2008 to 2009 and from 2019 to 2020. The price of private housing exhibited a similar but more vigorous trend. The price index of domestic private housing dropped from 163.1 at its previous peak in 1997 to 61.6 in 2003, kept rising to 296.8 in 2015, slightly dropped to 286.1 in 2016, and rose to 381.2 in 2020. Except during the Asian financial crisis, which began in 1997, housing prices have showed an obvious upward trend. Housing prices have increased about six times from their lowest to their highest point (Fig. 1). With the sharp increase in housing and rent prices, families, especially with low incomes, were forced to live in small houses. The median living area per capita in Hong Kong is less than 16 square metres, according to the Census and Statistical Department [C&SD] (2017a), which is relatively dense compared to other developed Asian cities, such as Tokyo, Shanghai, and Singapore (OHKE, 2018).

1.2.2 Statistics on subdivided units

In Hong Kong, a substantial number of poor people live in housing with small living areas, low quality, and high rent, sometimes referred to as inadequate housing; however, more people use the terms 'subdivided flats' or 'subdivided units' (SDU) to describe this type of housing. The Hong Kong government also adopted these terms in recent years and began a survey to investigate the background of SDUs and their residents. The C&SD in Hong Kong conducted three studies in recent years to examine the situation of SDUs (C&SD, 2015, 2016, 2017b). In these reports, SDUs "are formed by splitting a unit of quarters into two or more 'internally connected' and 'externally accessible' units commonly for rental purposes" (C&SD, 2016, p. 13). The Transport and Housing Bureau also set up a task force for studying tenancy control of SDUs. A comprehensive survey on the SDUs in Hong Kong was carried out in 2020 (Transport and Housing Bureau, 2021). The definition of SDU in 2020 is slightly different from that used in 2016. The 2020 SDU survey covered inadequate housing such as cubicles, loft spaces, bed spaces and rooftop houses, which was broader than the SDU definition in 2016. With the definition in 2020, SDU was used as a general and inclusive term to describe inadequate housing in Hong Kong. This study applied the definition of SDU in 2020. To overview, the number of households living in SDUs increased from 86,400 (with 195,500 people) in 2014 to 92,700 (with 209,700 people) in 2016 and 100,900 (with 226,300 people) in 2020. In 2020, the median floor area per person was 6.6 square metres,

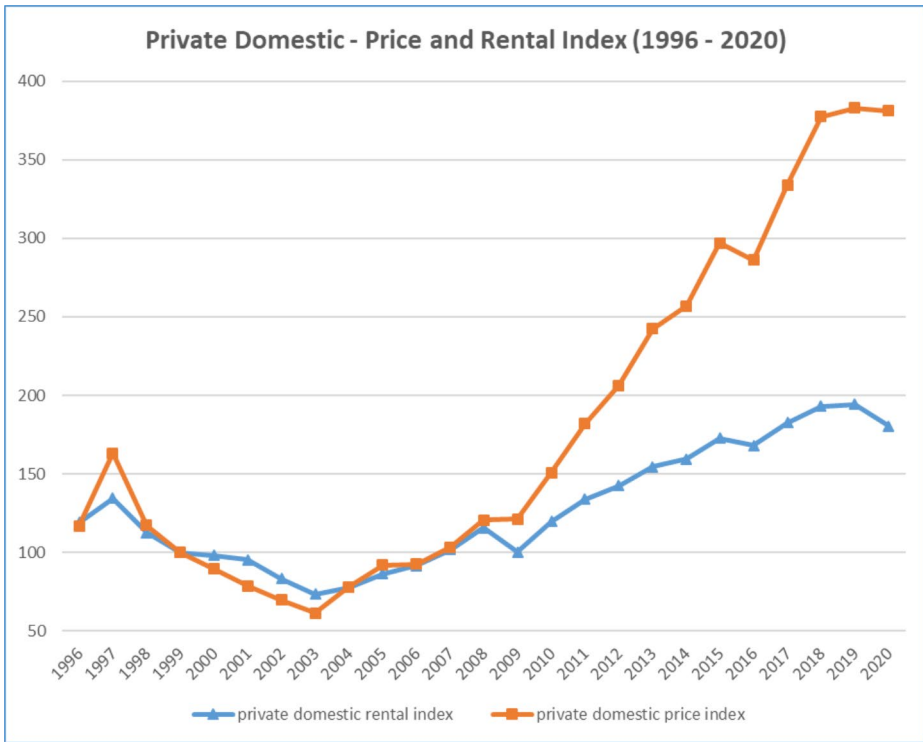


Fig.1 Private Domestic - Price and Rental Index (1996-2020)

median rent was HK\$4,800, and the rent-to-income ratio was around 32.3% to 35.0 with different household size (Transport and Housing Bureau, 2021). Moreover, nearly half the residents needed to move to other housing at least once in three years, and approximately half the residents applied and waited for public housing (C&SD, 2015, 2016). Generally, an increasing number of people lived in SDUs. While the price of rent increased, the tiny living areas remained the same. The results of the C&SD reports are summarised below (Table 1).

Table 1 Summary of official reports of subdivided flats and residents

	Thematic Report no. 57 (2014)	Thematic Report no. 60 (2015)	By-Census Report (2016)	Report of Task Force (2021)
Number of subdivided flats	86,400	88,800	92,700	100,900
No. of people in subdivided flats	195,500	199,900	209,700	226,300
Living area				
Below 7 m ²	15.3%	13.4%	12%	21.3%
7 to less than 13m ²	58.9%	65.2%	66.9%	41.7%
Median	9.5 m ²	10.3 m ²	10 m ²	11.5 m ²
Area of SDUs per capita (Median)	4.0 m ²	4.5 m ²	5.3 m ²	6.6 m ²
Monthly Rent (Median)	HKD 3,800	HKD 4,200	HKD 4,500	HKD 4,800
Rent-to-income ratio (Median)	30.8%	32.3%	31.8%	32.3–35.0%

Table 1 Summary of official reports of subdivided flats and residents

	Thematic Report no. 57 (2014)	Thematic Report no. 60 (2015)	By-Census Report (2016)	Report of Task Force (2021)
Household income (Median)	HKD11,800	HKD 12,500	HKD 13,500	HKD 15,000
Changed house in the past 3 years				
At least 1 time	48.8%	48.3%	N.A.	N.A.
3 or more times	8.1%	9.4%	N.A.	N.A.

Note. Source from Hong Kong Census and Statistics Department (2015, 2016, 2017) and Transport and Housing Bureau (2021).

1.2.3 Relationship between housing, health, and mental health in Hong Kong

In Hong Kong, little research exists about the relationship between housing, health, and mental health, with a few exceptions. For instance, research by Chung et al. (2019) also found that housing affordability affected the physical and mental health of residents, particularly those who were deprived. Moreover, a recent study conducted by Gou et al. (2018) indicated that the needs of residents and opinions about housing environments varied between residents. A recent study in Hong Kong also showed higher living density was positively associated with personal anxiety and stress (Chan et al., 2020).

Nevertheless, a number of existing quantitative studies have used static views to study the relationship between housing and health, with limited variables in each study. Subjectivity of the residents was not analysed in these studies. The choices, struggles, and voices of these residents are also important to consider. For example, how do low-income families deal with high rent prices for small units? How do limited budgets and poor living conditions affect residents' physical and mental health? How do residents respond to such difficult circumstances? The stories of these residents in Hong Kong can help demonstrate the relationship between housing, health, and mental health more comprehensively with dynamics and subjectivity.

1.3 Addressing research gaps with a conceptual framework

As demonstrated in previous sections, Hong Kong is a typical case of a global city with the special phenomenon of unaffordable housing and growing tiny flats (Chan, 2022). This critical context provides the basis for investigating the impact of housing factors on the health of individuals, along with how residents react to this situation. Moreover, research about the impact of housing, the dynamics of housing factors, and the reaction of residents has been understudied. Qualitative research by interviews will explore the pathways and mechanisms of the impact of housing on health and mental health. Additionally, residents' views about housing interventions have also been a missing piece in the literature, while the meaning and importance of public housing also requires additional studying. These foci will address current research gaps while underscoring the importance of this study.

The conceptual framework of this study is informed by previous research about the relationship between housing and health (Fuller-Thomson et al., 2000; Lawrence, 2012a), especially the Four Cs housing pillars of housing impact on resident health presented by Swope & Hernández (2019): *cost*, *conditions*, *consistency*, and *context*. An addition of a fifth C,

constitution, is used for this study to examine the living experiences of SDU residents. This framework is applied to an examination of the impact of these housing pillars on mental health. This proposed framework is illustrated below (Fig. 2).

2 Methods

2.1 Sampling

Purposeful sampling was used to select a sample of participants from the population. The population for this study was composed of residents who lived in private rental cubicles or SDUs over the past five years in Hong Kong and qualify as ‘income poor’ (with household income below the official poverty line) or housing poor (with housing costs greater than 30% of income). Among the cases, 17 of them were currently living in private cubicles or SDUs, 3 of them were lived in SDUs before and reallocated to public rental housing in recent three years. This cases selection strategy aims at examining how the change of housing type and living circumstance impact on their health situation. To maintain the quality of research, 20 cases were selected for the interviews on the following considerations: they were residents under different housing situations (maximum variation sampling), were residents from varied family backgrounds (maximum variation sampling), households that were facing severe housing poverty situations or problems (critical case and deviant sampling) and public housing residents with different durations of stay (maximum variation or

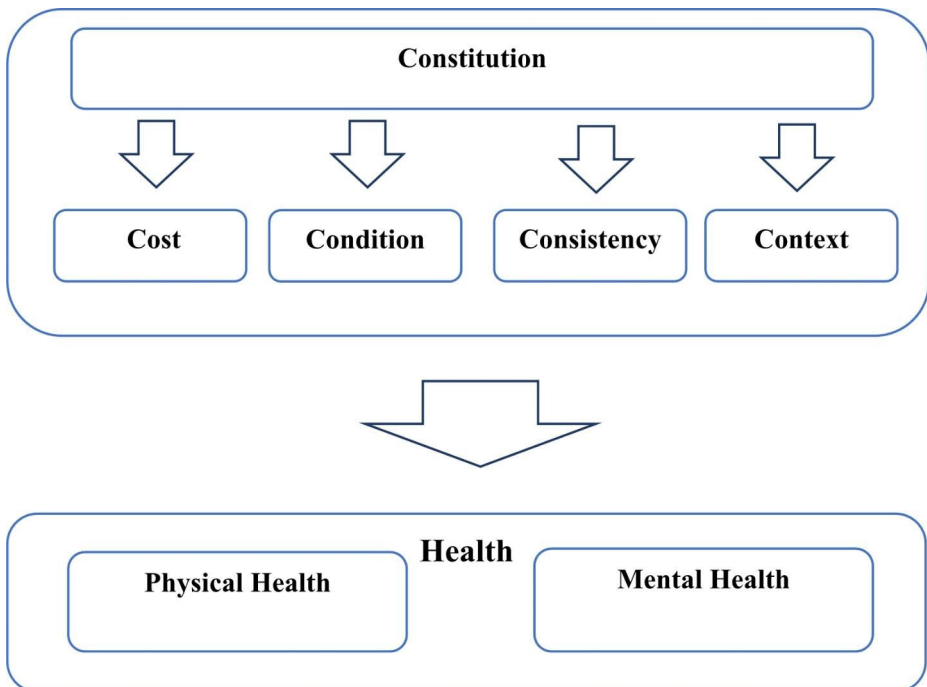


Fig. 2 Conceptual framework of relationship of Five Cs housing pillars and health

confirming and disconfirming sampling). All participants were adults who were willing to share their living experiences with the researcher during an interview.

2.2 Data collection

The researcher first contacted social workers from local nongovernmental organisations (NGOs) or community centres who worked with clients living in SDUs and explained the research aims and details. The researcher asked social workers to invite participants from the defined population for in-depth interviews. After learning about the research purpose and process, participants were referred by social workers and were interviewed by the researcher. Striving for diversity, participants were selected from different demographic backgrounds, including gender, family composition, and housing situation. Twenty participants were interviewed.

The researcher interviewed participants during home visits or public appointments at local community centres. A semi-structured interview guide was developed in reference to the previous literature to study the impact of housing factors on the daily experiences of participants, based on specific domains of housing: housing cost, living area, and indoor problems. Open-ended questions were asked to invite participants to share their views and feelings about the impact of their housing situation. Interviews included the following questions: 'How does your housing situation affect your daily living?'; 'Do you face housing problems, such as rent increase and eviction? How do these affect you?' and 'How do you cope with your situation?'

Participants were free to add additional comments at the end of the interview. Moreover, they were invited to fill in fact sheets, which asked about their demographic and socioeconomic information. Interviews were carried out between March 2019 and May 2019. All interviews were conducted in Cantonese. Each interview lasted for 60 to 90 min and were audio-recorded and transcribed into words using the Cantonese language. Data were then translated into English by the researcher.

2.3 Ethics

All participants joined the study with written informed consent. Interviews were recorded with the consent of participants and were kept confidential. The interviews were voluntary, and participants could withdraw from the interviews at will.

2.4 Description of participants

The twenty participants were invited to share specific housing experiences. Eight participants were male and twelve were female. Fifteen participants lived with other family members, and five participants were single. Three main types of housing were identified: SDUs, cubicles, and public rental houses. SDUs refer to living quarters split into two or more units, normally with a private bathroom and kitchen. Cubicles refer to living quarters split into many units, normally with a shared bathroom and kitchen. Public rental houses refer to housing units provided by the Housing Authority, with regulations on rent prices and housing quality. In this study, twelve participants lived in SDUs, five participants lived in cubicles, and three participants previously lived in SDUs within the past five years but

currently live in public housing. More than half the participants identified as income poor, while fifteen participants identified as housing poor. Seventeen participants faced housing issues, such as rent increases or moving houses (Table 2).

2.5 Data analysis

Audio-recorded interview data were transcribed by student helpers into written Chinese text. The transcripts were checked before being fed into the NVivo software version 12, for analysis. Then it followed the procedure of starting project, working with nodes, coding and going further with concepts, categories and themes (Hamed et al., 2013). Thematic analysis

Table 2 Profile of participants

	N	%
Sex		
Male	8	40
Female	12	60
Age		
18–40	8	40
41–59	6	30
60 or above	6	30
Family composition		
Singleton	5	25
Couple without children	1	5
Couple with children	11	55
Single mother with children	3	15
Education		
Primary or below	5	25
Secondary	14	70
Tertiary or above	1	5
Place of Birth		
Hong Kong	3	15
China (immigrated less than 7 years)	7	35
China (immigrated 7 years or more)	10	50
Housing type		
Cubicle	5	25
Subdivided unit (externally accessible)	12	60
Public housing	3	15
Income poverty (<50% of medium of household income)		
Income poor	11	55
Not income poor	9	45
Housing poverty (>30% housing cost per income)		
Housing poor	15	75
Not housing poor	5	25
Rent increased in the past 5 years		
Increased	17	85
No change	3	15
Moved housing in the past 5 years		
Yes	17	85
No change	3	15

was guided by the suggestions of Miles and Huberman (1994). The analysis focused on how housing factors impact the health of residents. The author first read and reread the transcripts to get a sense of all narratives of the residents. Data were then coded under open coding to capture the meanings of words of the participants. The used transcripts and formulated codes were translated to English by the author. Codes were then summarised into themes by the process described in the literature and the conceptual framework.

3 Results

Themes, delineated according to the Five Cs framework of *cost*, *condition*, *consistency*, *context*, and *constitution*, identified what housing problems participants face and how these problems impact physical and mental health. Participant responses about their current situation were also revealed.

3.1 Cost: 'I cannot afford to visit a doctor when I am seriously sick'

Most residents living in SDUs faced stress from lack of affordability. With high housing costs and low-income levels, families needed to lower their living costs, including food and medical and dental services. Informants demonstrated sincere concerns about their given health situations. Most participants reported a lack of disposable income after paying rent; therefore, medical, and dental services were unaffordable. In many cases, participants chose to delay seeing doctors and bought medicine for themselves, which created negative consequences to their physical health.

For example, Participant M, a mother of two children, usually procrastinated to use medical service because of expense: she seldom used a private medical service, and the public medical service was difficult to schedule. Sometimes, she could not book the public medical service and bought medicine directly from the pharmacy to save money. The waiting time for hospital accident and emergency (A&E) service is also long (Kong et al., 2015; Tsui & Fong, 2018) in Hong Kong. Sometimes, her son's illness became more serious because of procrastination. She felt guilty about the situation:

'After paying the rent, I have no spare money. When I am sick, I will not go to a private doctor, it is too expensive. Sometimes I just go to the pharmacy to buy medicine myself. It will be cheaper but does not really work. Like my son, he did not see a doctor in the beginning but then when he became worse, he is now really in serious trouble' (Participant M, female, 35, SDU).

The working poor also reported suffering with health issues. As rent was too high, they needed to spend long working hours to afford rent prices. They could not stop working, even if they were hurt, as the landlord or agent did not stop asking them to pay rent every month. These residents faced serious pressure under high housing costs.

For example, Participant R, who worked more than 10 h a day in a warehouse for several years, felt pressure when returning to his small living room each day. He questioned why his whole life was just working to pay rent. He once was hurt but could not stop working because he was living in a SDU. He was becoming depressed and, on one occasion, contem-

plated suicide. He was exasperated about living in a small SDU after working each day from morning till night. Participant R's situation improved when his family was allocated to live in public housing with lower rent and a stable contract. He could finally take a short break from work. Participant R's experience showed that lower housing costs result in physical and mental health benefits.

'Now, after getting public housing, the rent is much less than before, and I can take a short break, at last. After more than ten years of work, I felt much relieved now' (Participant R, male, 36, who moved from SDU to public housing).

3.2 Condition: 'Too small, too dangerous, too stressful'

Small living areas of less than 200 square feet are a common feature of SDUs, with most participants living in units of 30 to 50 square feet per capita. These small living spaces not only cause inconvenience for families but also create physical danger and psychological stress.

While living in a small unit, daily activities may cause more danger than usual. For example, cooking in a tiny kitchen was difficult for some participants, and they reported easily getting hurt when cooking in such a small area. Participant B, a working-poor female, attempted to cook to save money; however, she usually was hurt without much space to move around in the kitchen. Once, she seriously cut her hand in the kitchen and ran to the hospital:

'I cut my hand in the kitchen as it is too small. I was so scared, I kept crying, kept bleeding and was running in the street. It was horrible' (Participant B, female, 59, SDU).

Moreover, since they found the unit to be too tiny, most family members needed to share sleeping rooms. This not only impacted participants' sleep quality but also caused physical harm on occasion. For example, Participant O once lived in a small cubicle and slept with his wife and daughter in the same bed. Once, he fell from the bed and was seriously hurt. Poor living situations, such as noisy indoor and outdoor environments, also affected the sleep quality of participants. The situation was even worse for those living in cubicles and bedspaces.

Besides physical health, small living areas also caused great impact on participants' mental health. Many participants reported suffering from psychological stress and mental illness when living in small SDUs. For example, Participant F, a working-poor single mother, sadly shared that her small living area usually made her feel stress at home. Without good mentality, she felt it difficult to work hard and improve her life:

'I think everyone needs to feel good to be able to work hard. However, if you are living in a small place, there is bound to be much psychological pressure and stress. Under high pressure, you may lose the direction in your life. I do really agree.' (Participant F, female, 46, SDU).

Consequently, a change in housing environment could critically improve the mental wellbeing of participants. Participant Q shared that she was consulting a psychiatrist for mental

illness. When she was living in a SDU, the small living space suffocated her, and she felt sad every day. She felt her poor housing situation made her mental status decline. Later, after she moved to public housing, she found that the psychological pressure decreased, and her emotional state improved. She felt more comfortable when she moved back to a house with enough space to rest and sleep much better than before.

3.3 Consistency: 'I do not want to move anymore!'

Consistency is crucial for personal and family planning. Most families in the study were afraid of moving around or being evicted by landlords since it was difficult to find affordable housing. Housing precariousness created a negative impact on the health of participants.

For instance, Participant M reported being under pressure when she thought of moving. She had moved approximately ten times since immigrating to Hong Kong from Mainland China. Housing precarity resulted in severe psychological distress for her and her family. She emphasised that signing a rental contract was important to her since she was afraid of repeatedly moving:

'The landlord can evict you or increase the rent, do whatever they want. The instability really made me suffer psychologically. I was stressed and anxious when moving to a new house. In the past, I had to move to other houses more than ten times. It was really a tragedy' (Participant M, female, 35, SDU).

In Hong Kong, a common practice for signing rental contracts is known as 'one year fixed; one year flexible'. During the fixed year, the tenant cannot end the contract and must pay throughout the entire year, while the landlord cannot evict the tenant without due cause. However, during the flexible year, the landlord can end the contract with only one month's notice.

Low-income, working-poor participants reported suffering due to housing precariousness. Some participants did not have a stable job or income; thus, they faced double precariousness, employment, and housing, which created extremely high pressure for their families.

For example, the husband of Participant S, a cook, usually faced employment insecurity and needed to change jobs. However, the family could not stop paying rent during the transition period. Participant S shared that her husband had to maintain savings for moving to other houses. Once the landlord increased the rent to an unaffordable level, the family needed the money to secure a new unit:

'We saved a little money when the work of my husband was stable. If you were forced to move out, you needed to be prepared to pay two to three months' rent. So, you used the saving when you moved to a new house. Every time you moved you used more than ten thousand to move one time, for buying furniture, for lifting furniture. We need to use the money at every step' (Participant S, female, 35, who moved from SDU to public housing).

3.4 Context: 'My neighbour is so dirty and noisy! What can I do?'

According to the framework of Swope & Hernández (2019), *context* refers to neighbourhood characteristics and resources. The stories of participants who lived in SDUs illustrated that physical and mental health was not only based on their personal issues but also on their living context.

For example, Participant C and his wife were elderly with trachea problems, and they maintained proper hygiene at home. However, the air ventilation in their unit was so poor that they were affected by a smell from their neighbour's toilet while they were eating:

'The ventilation is extremely poor here. The air pumped from the exhaust fan of neighbour. It affects our trachea and even eyes. And the toilet is too near my eating place, how can I eat? The hygiene is bad' (Participant C, male, 69, SDU).

Another common problem was that participants could not sleep well because of their living environment with indoor and outdoor noise. For example, a participant lived too close to her neighbours and easily woke up from their noise:

'My neighbours wake up very early in the morning, and they speak very loudly! Also, the rain drops on the iron rooftop and make noise continuously. These things make me sleep very badly everyday' (Participant E, female, 63, cubicle).

Moreover, mental health is related to self-image, as well as an assessment of poverty levels by friends and neighbours. Thus, the housing context of participants critically affected their evaluation of their quality of life. Many participants reported feeling shameful for living in a SDU. They hesitated to tell others where they live. SDUs have become a symbol of poverty. At the same time, the advertisement of luxury homes has also been common in the media. Thus, it is common for the poor to compare their living conditions to others in the same city.

3.5 Constitution: 'Housing problems are all about policy'

During their interviews, participants were asked whether they had any reflections about their current situation. Most of them condemned existing housing policy and the welfare system. Three main themes included the loose regulation of the housing market, the lack of supply of public housing, and the unjust distribution of land.

Most participants faced the problem of high rent prices, and they were discontented about the situation, claiming the problem is rooted in the loose regulation of the housing market in Hong Kong. However, the responses to the free housing market were different among them. Some participants felt hopeless about the housing market and felt that tenants mostly suffered because of loose regulations.

Participant N, although angry about high rent prices, said she had no bargaining power in the landlord-tenant relationship:

'You cannot bargain. You cannot. Like free trade, how can you bargain? They can increase the rent whenever they want. It is useless even if you have a signed contract.'

There is no rent control in Hong Kong for decades. You cannot bargain' (Participant N, female, 72, SDU).

Moreover, several participants wanted to ask the government to execute tighter housing market regulations to limit the rise of house and rent prices. Despite a large demand from low-income families, the supply of public housing with its lengthening wait times has been a nightmare for the poor. The long wait time of public housing costs participants a great deal in terms of precious time and money.

For instance, Participant D shared that it was horrible for her family to wait six to seven years for public housing, while they had to spend a lot of money on rent for private housing:

'You cannot balance the income and expense. The rent is too high. The government claimed again and again that they would build more public housing, but we waited for more than six to seven years. How much have we spent in these years? How hard it is, you know?' (Participant D, female, 50, SDU).

The failure of policy in market regulation and housing supply continues to contribute to housing problems such as high housing costs, poor housing conditions, and severe inequality, which further negatively influences the physical and mental health of residents.

4 Discussion and conclusion

This study examines the impact of different housing dimensions on the health and mental health of individuals who live in SDUs, cubicles, and/or public housing. The conceptual framework of this study refers to the Four Cs framework, created by Swope & Hernández (2019), to analyse the impact of housing on the health of residents. The framework was advantageous in capturing the circumstances in Hong Kong, which has an extreme housing crisis of unaffordable housing costs, tiny living spaces, poor housing quality, and precarious situations.

This study extends the current theoretical framework in two directions. The first extension is the revision of the Four Cs framework to a Five Cs framework, with the addition of *constitution*, which emphasises the social determinants of health (Lawrence, 2012a). *Constitution* is the macrostructure influencing the other Four Cs, and it limits the idea of *choice* being an additional C in the framework, which negatively impacts the health of residents. Constitution refers to the ideology, housing policy and systems, such as housing planning and market regulation, which influence the supply, finance, management and culture of housing and crucially affect the livelihoods of every resident (Malpass & Murie, 1999). For example, the lack of public housing supply will force low-income families houses that offer poor living condition at a high rent. The legislation to secure the tenure can enhance the consistent occupancy of a residence. Moreover, the regulation of the basic living standard can also improve the quality of neighbourhood interaction. These showed that the 5th C, constitution, was closely related to other 4 Cs, cost, condition, consistency and context. In their interviews, most of the informants connected their housing problems with the macro system, including land and housing supply, market regulation and government policy intervention. The experience of the residents highlighted the linkage between the original 4 Cs

framework and the added 5th C. Although Swope & Hernández (2019) mentioned structural factors in the conceptual model, these factors were not highlighted and were not sufficiently explained. The dimension of *constitution* is especially important in analysing the situation in Hong Kong as a typical example of a global city. The housing problems, including high housing cost, poor living environment and unstable housing situation for the low income families, are highly influenced by macrostructure, such as the financialisation of housing, a rapid flow of capital, and loose housing market regulation (Cheung, Chow, & Yiu, 2017; Smart & Lee, 2003). The adding of the 5th C to the framework for analysing the impact of housing on health is one of the key contributions of this study. This addition was the result of the experience of residents which made them concerned about the root causes of their concerns over the four Cs arising from the housing problems.

The 4 Cs are also related to each other. For example, low-income families were not able to afford higher housing cost and could not choose houses that provide better housing conditions and outdoor environment. Moreover, the unstable housing situation and high cost of housing may also link up with poor housing situation. The residents treated their living space as temporary and would not spend money or invest effort in enhancing the living environment. Also, the high rent they pay leaves no money spare for improving the condition of their houses. The living experience of SDU cases demonstrates how the residents struggle with the problems with the 4 Cs in housing. Another contribution of this study was the extending of the application of the five Cs framework to mental health, which is crucial in the context of the growing concern over the association between housing and mental health (Bentley et al., 2016; Singh et al., 2019). This revised framework creates a comprehensive structure for further study. The stories of the study's participants demonstrate that the housing pillars of the Five Cs framework are interrelated and interact with each other.

Hong Kong is an example of a global city that faces high housing and rent prices, due to the financialisation of housing and loose market regulations under neoliberalism (Wong & Chan, 2019). Because housing and rent prices quickly skyrocketed, low-income families were unable to buy a house or even to rent individual units, instead forced to live in tiny or shared units. The growing number of people in Hong Kong who are living in SDUs has raised levels of public concern (Fung et al., 2021; Huang, 2017). However, to date, little research has investigated the mechanism of the impact of housing conditions on the health of residents. Hence, this study is important because it reveals the stories of residents who explain why the housing situation in Hong Kong is so critical. The results of this study echo previous studies (Chung et al., 2020; Gou et al., 2018), which showed a significant association between housing and health. This study further illustrates the mechanism of how housing factors influence the physical and mental health of individuals within a Five Cs framework. This framework can also apply to further investigations about the impact of housing elements on health in other global cities with severe housing problems.

The importance of housing perspectives as an influence on physical and mental health was highlighted in this study. To enhance the physical and mental health of residents requires more than additional medical services. Instead, government intervention in the housing market and the implementation of appropriate housing policy can also help. For *cost*, tighter housing market regulations is one policy option to control housing costs. The Landlord & Tenant (Consolidation) (Amendment) Ordinance 2021 was taken effect on January 2022 in Hong Kong to regulate tenancies of subdivided units. The key requirements included not allowing rent increase during the term of a regulated tenancy, limiting the rate of rent

increase for the second term at 10 per cent, and securing tenants for four years of tenure. These measures potentially cause a positive impact on the tenants. Nevertheless, it was criticized that the government need to step up inspections and implement a starting rent for SDUs to regulate the rent. On the other hand, providing more affordable housing is crucial to lowering housing costs for residents. The Hong Kong government initiated the transitional housing policy in 2018. There has been a growing number of social housing projects facilitated by NGOs and supported by government policy since 2020. Transitional housing projects housing to low-income families with reasonable rent and living conditions, which were much better than the circumstance in SDUs. The impact of transitional and social housing on residents is worth studying in the future. The construction of many social housing residences may contribute to the solution.

In terms of *condition*, a stronger regulation of living conditions is needed. In 1994, the Hong Kong government enacted the Bedspace Apartments Ordinance to regulate the living areas and conditions of bedspaces, which is an apartment where 12 or more people rent individual bedspaces; however, the government neglected additional regulation in the following years. Numbers of SDUs in Hong Kong are illegal, and there have been increasing injuries related to illegal subdivisions in the past years (Yau, 2022). The existing regulation under Buildings Ordinance (BO) and the requirements under the Minor Works Control System (MWCS) may protect residents from extremely poor living conditions. Nevertheless, the lax enforcement of building regulations allowed growing of illegal SDUs. Thus, the government must tighten regulations when faced with the growing number of SDUs with tiny living areas, as well as step up enforcement. Housing services and assistance are also suggested for improving housing conditions (Nelson et al., 2007).

Concerning *consistency*, eviction (Desmond & Gershenson, 2017) and housing precariousness (Prout Quicke & Green, 2017) has become more common in urban cities. In Hong Kong, security for the tenure of residential premises was rescinded in 2004. Since then, landlords only need to provide tenants one month's notice before eviction; consequently, recent pressure is increasing on the Hong Kong government to reintroduce tenancy control to protect tenants' rights from precariousness (Legislative Council, 2017).

In terms of *context*, individual and separated units must be promoted to minimise the negative consequences of shared living, such as poor hygiene and noise problems. Moreover, a reduction of housing inequality by building more suitable low-income housing can reduce the comparison between the poor and rich, while promoting better self-image for the poor. Based on the interviews in this study with participants who left a SDU to move to public housing, public housing can provide a stable living situation with low rent and a suitable living area. A progressive increase of the supply of public housing is suggested to promote better health for residents. This proposal should not be limited to Hong Kong but should also apply to other urban cities with similar housing crises.

There are several limitations in this study. First, given the small sample size, the qualitative interviews cannot lead to generalised conclusion. Instead, this study aims at exploring the subjective experience of the residents and attempts to extend the existing theoretical framework for further study. Second, the impact of housing on health shared by the residents was relatively short-term. Further, longitudinal studies are needed to explore the long-term effect of housing on health. Third, since this study focuses on the impact of housing factors on health, the interaction among housing factors was not studied in detail. For example, residents may trade off accessibility with space and housing environment. It is worth studying

in the future. Fourth, this study focused on examining the subjective experiences of SDU residents and might overlook the views of other stakeholders related to inadequate housing, such as social workers and healthcare professionals. Moreover, the perspectives of health were limited in physical and mental health. The social perspective of health is worth further investigation.

Data Availability Data not available due to privacy/ethical restrictions.

Declarations

Ethical approval This study was approved by the Survey and Behavioral Research Ethics Committee of The Chinese University of Hong Kong in Oct 2018.

Statements and declarations No potential conflict of interest was founded.

Consent to participate Informed consent was obtained from all individual participants included in the study.

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